

colouring matters in the shells of birds' eggs. Permit me to call attention, through your journal, to a long and detailed paper on this subject published by me, about four years ago, in the *Proceedings* of the Zoological Society of London. Apparently the authors who have lately treated on this subject have not been aware of the existence of this paper. As far as they go, the facts they have described fully confirm my conclusions; but, as I have shown, different birds' eggs contain at least five perfectly distinct coloured substances, and not, as Liebermann says, only two. One of these is closely related to a product of the decomposition of haemoglobin and another to the bile pigments, it and the bile of birds yielding the same well-marked product on oxidation.

H. C. SORBY

Kingstown, Dublin, August 6

The Limbs

In his interesting papers on "The Genesis of the Limbs," which have recently appeared in NATURE, Mr. Mivart mentions that I have represented the limbs as modified portions of a primitively continuous inferior azygos fin.

That view was stated by me at length in a paper in the *Journal of Anatomy and Physiology*, 1871, vol. v., p. 59. It was formed from the following considerations among others—First, that the mesial, or azygos fins, are essentially double organs, being formed from the coalesced elements of the dorsal and ventral plates of the two sides, and being furnished with muscles, nerves, and blood-vessels, from the two sides. They may therefore be the representatives of organs which remain double, that is, of organs in which the lateral elements do not coalesce. Secondly, the limbs and the azygos fins do not co-exist in the same region. The limbs are formed where the ventral plates are kept apart and expanded by the presence of the visceral cavity, so that the elements which in the dorsal and postanal regions meet and unite into azygos fins, are here separated and grow out as lateral limbs. The ventral plates are, moreover, continued onwards beyond the outgoing line of the limbs, and form the median portion of the visceral wall which lies beneath and between the limbs on the two sides. Thirdly, there is such a marked resemblance between the ventral fins in some fishes and the anal fins, that the transition from the one to the other is easy; the dagger-shaped pelvic bones being the representatives of two or more coalesced intraspinous bones and the ray bones of the one set being, in like manner, the representatives of the ray bones of the other.

Mr. Balfour in his admirable papers on "The Development of Elasmobranch Fishes," in the *Journal of Anatomy and Physiology* shows (vol. xi. p. 133), that the limbs are the remnants of continuous lateral fins, and that the ridges from which they are developed are in every way like the folds from which the unpaired fins are formed, but the development and growth are confined to two special points on each side instead of being continued, as in the case of the dorsal and anal fins, along a greater length of the fold. He further remarks that, externally, they closely resemble the unpaired fins, and both their position and nervous supply indicate that they do not belong to one special segment of the body. The lateral ridges, from which they are developed, I conceive to be the continuations of the diverging lateral halves of the essentially double ridge of the caudal fin kept asunder by the presence of the visceral cavity. These are but little separated in the position of the ventral fins, and are more so in the position of the pectoral fins. If this be so, the limbs are specialised differentiations of primitively continuous lateral folds—of portions, that is, of the diverging plates of the median fold from which the caudal fin is developed.

I cannot, however, assent to Mr. Mivart's view that the limbs are mere appendages to the axial system, or admit that either they or the limb girdles are the result of centripetal growth, "due to the growth of originally superficial structures—exoskeletal hardenings which have grown inwards and become endoskeletal." The limb girdles are found in the same plane of the mesoblast as the ribs, and are, as I have shown in the "Anatomy of the Cryptobranch" (*Journal of Anatomy*, vol. vi. p. 9, and *Observations on Myology*), though not necessarily the serial homologues of the ribs, yet like them the result of ossification in the ventral transverse intermuscular septa. As they grow out they carry before them envelopes not only of skin, but of muscle, derived from the body-wall, which become differentiated according to the

requirements. Moreover, although the ridges from which they are primarily developed may appear at first as epiblastic projections, these are soon supplemented by accumulations of mesoblastic tissue in which the components of the limbs are chiefly formed.

G. M. HUMPHRY

Cambridge, August 1

The Darkness of Caverns

THE impenetrable darkness of caverns has been for a very long time a recognised fact, without its cause having been satisfactorily explained. This darkness vanishes but partially before torch-light, and that only in a very limited radius. I, in my explorations in the caverns of Spain, had also noticed this circumstance, and now that I have verified it in others in Switzerland, I venture to think that I have found the explanation of this phenomenon.

The walls as well as the roof and floor of caverns are continually covered with moisture, which works without interruption in condensing the corpuscles that float in that circumscribed space. It thus performs the same function that the glycerine does which varnishes the sides of the crystal box by means of which Prof. Tyndall obtains an optical vacuum, the light diffusing itself imperfectly from want of those atoms which act as reflecting bodies. I have had occasion to verify my supposition by scattering around the torch very fine dust of different substances. The brightness diffused itself regularly all the time that the dust maintained itself in the required state of closeness and fluctuation, and vanished again slowly as the dust spread or deposited itself. The earth or common dust is the one which, in my experience, has produced the best effect.

SALVADOR CALDERON

Scent and Colour in Flowers

THE extension of our perceptive faculties of sight and hearing by various optical and acoustical instruments may enable us to comprehend the possibility of these faculties existing in other creatures to a degree so far surpassing ours as to seem a difference almost of kind. So the sight of the vulture would seem to be paralleled by the faculty of smell in moths, as evidenced by the detection of distant females by males. It would seem probable that the sense of smell may guide insects at a far greater distance than that of vision; for a consideration of the structure of the eyes of insects leads to the belief that they are not capable of forming clear images of distant objects. While, then, the scent of its blossoms may attract insects to a plant, their colour will act as a subsequent guide to the individual flowers, just as variegations undoubtedly act as honey-guides when the insect reaches the flower. This view is borne out, firstly, by the undoubted connection between perfume and pollination, shown by Morren in the case of the orchid *Maxillaria*, whose aromatic perfume lasts till pollination; and, secondly, by the well known connection of odour both with colour and with natural groups, white flowers being mostly sweet-scented, brown and orange ones most fetid. The insect could thus identify species before seeing them. Mr. Wallace has been, perhaps justly, blamed by a writer in the *Gardener's Chronicle* for saying that brightly-coloured flowers are seldom scented, and Dr. Taylor by "J. S. G." (NATURE, vol. xvii. p. 277), for saying that white flowers open mostly at night. It would, I think, be truer to say that few flowers are both variegated and scented, i.e., that scented flowers are mostly monochromous, and that the majority of night-blooming flowers are white. The latter is a very different matter from saying that the majority of white flowers are night-blooming. We can perceive with difficulty that one part of a flower is more scented than another, yet scent may replace the dots and point-indicating lines of variegation to the senses of an insect. Nature not only often effects one purpose by divers means, but also uses one means for divers ends; so just as colour exists in plants, not only to attract insects, we can understand it being absent in some white flowers simply as a phenomenon of degradation and not as one of specialisation. The dog-rose, white convolvulus, and daisy, mentioned by Mr. Gardner as closing at eventide, are all scentless. The first, according to Dr. Hermann Müller, is visited by six hymenoptera, two diptera, and twelve coleoptera. The convolvulus does not close till between eight and ten P.M., and re-opens by moonlight. It is visited by two diptera, *Podura*, *Thrips*, one coleopteron, two hymenoptera, and the *Sphinx con-*

volvuli, L. This is a dusk-loving hawk-moth, which also visits the honeysuckle. The daisy is visited by nine hymenoptera, thirteen diptera, three coleoptera, and two lepidoptera, viz., the least meadow brown and the common blue butterflies. Many flowers, like *Lychnis vespertina*, remain open without exhaling their perfume, and I think Mr. Gardner will find that most of the subdued-coloured flowers which are open at night give off most perfume, and are visited and fertilised by moths rather than in the dark, whilst the white ones remain fragrant still later. The clearly-cut discs of white of *Lychnis vespertina* are the last objects our eyes can often discern on a midsummer night's ramble. Of course variegation on the moths themselves would be as useless, from the point of view of sexual selection, as on the flowers from that of insect-fertilisation. Though it is to a certain extent true that like causes produce like effects, in investigations into phenomena so complex in their etiology as those of biology we must, I think, be more mindful that the converse that like effects are the result of like causes by no means necessarily follows.

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SCIENTIFIC SERIALS

Rendiconto delle Sessioni dell' Accademia delle Scienze dell'Istituto di Bologna.—The more important papers read at the Academy during the academical year 1877-8 were the following:—On the metamorphosis of plants, by Prof. G. B. Ercolani. The author specially refers to the transformation of a crypto-gamous plant of the genus *Uromyces* into a phanerogamous dicotyledon, *Cuscuta europaea* L., and the return to the primitive cryptogamous form apparent in the seeds and branches of the *Cuscuta*.—On the velocity of light in transparent magnetised bodies, by Prof. A. Righi.—On the concentration of a magnetic solution near the pole of a magnet, by the same.—On the curves with equal normal principals, by Prof. A. Fais.—On some researches to ascertain whether from cadaverous matter, from albumen, or yolk of eggs, volatile phosphoretted products are evolved, and on an excellent means of discovering free phosphorus in minute quantities, by Prof. Francesco Selmi.—Crystallographical researches, by Prof. Carlo Maragno. The author describes some theoretical and experimental researches, and their application to the natural history of crystallised minerals.—Contributions to the flora of the Bolognese province, by Prof. Girolamo Cocconi.—Researches on the varying nature of the caloric emitted by various bodies heated to 100° C., by Prof. E. Villari.—On four species of noxious insects, inhabiting pines and birches, by G. Bertoloni.—On the calcareo-siliceous conglomerates of Sasso Cardo and of the Rio Fonti, and on the origin of pyrites, by Prof. Domenico Santagata.—Critical observations regarding some recent Italian crystallographical publications, by Prof. Luigi Bombacci.—On comparative psychogeny and the attempts to establish a zoopsychological classification, by Prof. Siciliani.—Note on a theorem in the theory of binary forms, by Prof. Francesco d'Arcalis.—Observations regarding the existence of rudiments of upper canine teeth and incisors in the embryos of oxen and sheep, by Dr. G. P. Piana.—Anatomy and physiology of *Surilla Neapolitana*, by Prof. Salvatore Trinchese.—On a problem in undetermined analysis occurring in the geometrical theory of the transformation of plane figures, by Prof. F. P. Ruffini.—Geometrical studies on the molecular equilibrium, by S. Canevazzi.—On some gigantic bird-remains, probably belonging to *Aepyornis* or *Ruck*, by Prof. G. Bianconi.—On the internal texture of the eye of *Sphinx*, by Prof. G. V. Ciaccio.—On the origin and structure of the humor vitreous, particularly in the embryos of the two first classes of vertebrates, by the same.—On the whale of Taranto and the *Macleayius* of the Paris Museum, by Prof. G. Cappellini.—On the emery from S. Lucca and Paderino, and its fossils, by Dr. Lodovico Foresti.—On the reticular structure of the red corpuscles in the blood of *Torpedo*, and of the nerve substance of frogs, by Prof. Salvatore Trinchese.—Researches on the central nervous system of *Squilla Mantis*, by Dr. G. Bellonci.—Results of experiments made at the Royal Botanical Gardens of Bologna upon some species of *Eucalyptus*, and upon a new grass recently introduced in Italy, by A. Bertoloni.—On the nerve ends in the skin of bat's wings, by Dr. Agostino Rossi.—On the formation of protoxide of iron in the metallic state in the wet way, by Prof. Francesco Selmi.

SOCIETIES AND ACADEMIES

MANCHESTER

Literary and Philosophical Society, April 2.—E. W. Binney, F.R.S., F.G.S., president, in the chair.—On aurin, by R. S. Dale, B.A., and C. Schorlemmer, F.R.S.—The origin of some ores of copper. Part II., by Charles A. Burghardt, Ph.D.

April 16.—Note on the occurrence of dioptase on Chrysocolla, from Peru, by Charles A. Burghardt, Ph.D.—On the internal cohesion of liquids and the suspension of a column of mercury to a height more than double that of the barometer, by Prof. Osborne Reynolds, F.R.S. The object of this communication is in the first place to show that certain facts already fully established afford grounds for believing that almost all liquids, and particularly mercury and water, are capable of offering resistance to rupture commensurate with the resistance offered by solid materials; in the second place to describe certain experimental results which, as far as they go, completely verify these conclusions and subvert the general ideas previously mentioned as to the limits to the height to which mercury can be suspended in a tube or water raised by suction; and, in conclusion to explain the nature of the circumstances which have resulted in the practical limits to these phenomena.—On the estimation of hyposulphites and sulphites, by J. Grossmann, Ph.D.—Note on the action of iodine trichloride upon carbon bisulphide, by J. B. Hannay, F.R.S.E., F.C.S.

PARIS

Academy of Sciences, August 5.—M. Peligot in the chair.—Probable new observation of the planet Vulcan by Prof. Watson, by M. E. Mouchez.—On the orbito-ocular phenomena produced in mammals by excitement of the central end of the sciatic nerve, after excision of the superior cervical ganglion and the superior thoracic ganglion, by M. A. Vulpian.—New note on the progress of phylloxera in the two departments of Charente, in connection with the last communication of M. de la Vergne, by M. Bouilland.—Rate of propagation of excitations in the motor nerves of the red muscles, abstracted from the power of the will, by M. A. Chauveau.—On the fundamental covariants of a cubo-quadratic binary system, by Prof. Sylvester.—On the baking of plaster, and on the manufacture of plasters by slow coagulation, by M. Ed. Landrin.—No mycium intervenes in the formation and in the normal destruction of swellings developed under the influence of phylloxera, by M. Maxime Cornu.—On the abnormal solubility of certain bodies in soaps and alkaline resins, by M. Ach. Livache.—On the vibratory forms of solid bodies and of liquids, by M. C. Decharme.—Note on the intra-Mercurial planet, by M. Gaillot.—Results of solar observations during the second quarter of 1878, by M. Tacchini.—Action of chloride of zinc on methyl alcohol; hexamethylbenzene, by MM. Le Bel and Greene.—Researches on the connections which exist between the weight of various bones of the Biscayan whale (*Balena biscayensis*), by M. S. de Luca.—On *Prosopistoma sanctifrons*, Latr., by MM. E. Joly and A. Vayssiére.—On the influence of atmospheric electricity on vegetation, by M. L. Grandjean.—Age of the Mont-Dol bed; constitution and formation of the low plain called Marais de Dol, by M. Sirodot.

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